REMARKS

Applicants would like to thank the Examiner for the second complete examination of the present application. Favorable reconsideration and allowance of the subject application are respectfully requested. Claims 1-6 are pending in the present application, with claims 1 and 5 being independent.

Applicants have amended independent claim 1 in an effort to clarify the claim. Specifically, Applicants have amended the claim in order to distinguish the individual data packets between a first set and a second set. This amendment has not been made to overcome any prior art nor does it alter the scope of the claim.

Specification

Applicants have amended the specification in an effort to place the specification into proper form for U.S. patent practice. Applicants respectfully submit that the substitute specification does not add any new subject matter.

Drawings

Applicants submit herewith a replacement drawing for the non-formal figure that was filed on August 25, 2000. This drawing does not add any new subject matter. Accordingly, acceptance of the drawing is respectfully requested (see item 10 of the Office Action Summary).

Claim Rejections Under 35 USC §103

The Examiner rejected claims 1-4 under 35 U.S.C. §103(a) as being unpatentable over *Braun* (US 6,111,860) in view of *Bishop* et al. (US 4,914,653); and claims 5-6 under 35 U.S.C. §103(a) as being unpatentable over *Seazholtz* et al. (US 5,737,706) in view of *Bishop* et al. These rejections are respectfully traversed insofar as they pertain to the presently pending claims.

Independent claim 1

Independent claim 1 is directed to a method of transmitting data over a bidirectional radio channel. Digital data that is to be transmitted is divided into a first set of individual data packets according to a first data transmission protocol. Then, at a transmitting and receiving station of the bidirectional radio channel, the data is divided according to a second data transmission protocol into a second set of individual data packets. Thereafter, the second set of individual data packets are transmitted alternately forward and in reverse between transmitting and receiving stations over the radio channel by a simplex transmission operation. At each transmitting and receiving station a number, a length, a priority, and/or a type of the first set of individual data packets generated by the first data transmission protocol is determined as a data packet identifier, and a length of

the second set of data packets generated by the second data transmission protocol is determined in at least one of the transmitting and receiving stations as a function of these data packet identifiers for optimum utilization of radio channel capacity.

In rejecting Independent claim 1, the Examiner acknowledges that Braun does not teach "a first data transmission protocol with identifiers of a number, a length, a priority or a type." The Examiner, however, cites Bishop et al. for support thereof.

Braun is directed to a communication interface system for half duplex digital radios. The interface system modifies the X.21 HDLC protocol to transmit and receive from Data Terminal Equipment (DTE) to Data Communications Equipment (DCE) by utilizing an indicate "I" signal and control "C" signal, which are already provided in the X.21 protocol. During, for example, a transmission operation, the DTE transmits data to the DCE by utilizing the developed protocol of Braun. The DCE then transmits to another DCE the data provided by the DTE, via a radio link.

Applicants respectfully submit that the Examiner failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met: (1) there must be some suggestion of motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to

combine reference teachings; (2) there must be a reasonable expectation of success; and (3) the prior art reference must teach or suggest all the claim limitations, see *In re Vaeck*, 947 F.2d 48, 20 USPQ2d 1438 (Fed.Cir.1991).

The cited references do not contain any motivation to combine. An essential evidentiary component of an obviousness rejection is a teaching or suggestion or motivation to combine the prior art references.[1] Combining prior art references without evidence of a suggestion, teaching or motivation simply takes the inventors' disclosure as a blueprint for piecing together the prior art to defeat patentability -- the essence of hindsight.[2] Evidence of a suggestion, teaching or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or in some cases, from the nature of the problem solved.[3] However, a rejection cannot be predicated on the mere identification of individual components of the claimed limitations.[4] Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention would have selected these components for combination in the manner claimed.[5]

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[1] see *C.R. Bard, Inc. v. M3 Systems, Inc.*, 48 USPQ2d 1225 (Fed. Cir. 1998).
[2] see *Interconnect Planning Corp. v. Feil*, 227 USPQ 543 (Fed. Cir. 1985).
[3] see *In re Dembiczak*, 50 SPQ2d 1614 (Fed. Cir. 1999).
[4] see *In re Kotzab*, 55 USPQ2d 1313 (Fed. Cir. 2000).
[5] Id.

Referring to col. 9, lines 35-38, Braun teaches that the half duplex receiver operates with the X.21 protocol and transmits and receives data according to that protocol. In other words, transmitting between DCE VHF radios, the DCEs utilize the X.21 protocol in a conventional method.

Braun, however, does not teach that a second set of data packets (that are generated by a second data transmission protocol) is determined as a function of a data packet identifier so that an optimum utilization of radio channel capacity is achieved. Whereby the data packet identifier is a number, a length, a priority, and/or a type of a first set of data packets that were generated by the first data transmission protocol. In other words, Braun does not even remotely teach that a length of the data being transmitted between DCEs is adjusted or determined on the basis of a transmission protocol between the DCE and the DTE. Braun merely teaches that "data is transferred between the radio and the DTE in bursts and these bursts are no greater than 1500 bytes in length," see col. 9, lines 13-15. Braun, as stated above, contains absolutely no teaching that the data length between DCEs (radios) are adjusted.

In fact, referring to col. 10, lines 26-33, of Braun, it is expressly taught that "Zero bit insertion/deletion and CRC generation and validation <u>is not performed by the radio</u>. Transmitted and received frames are encapsulated by the radio

waveform process and passed between radios to their directly connected DTE which performs the zero bit insertion/deletion and CRC generation/validation." Emphasis added.

Thus, it should now be evident that one skilled in the art would not modify the system of Braun to incorporate the teachings of Bishop et al. because the teachings of Bishop et al. do not make up for the deficiencies of Braun.

Furthermore, one skilled in the art would not combine Braun with Bishop et al. because they are non-analogous art and therefore, the alleged combination of Braun and Bishop et al. is improper.

"In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned."[6] Furthermore, MPEP 2141.01(a) states that PTO classification is some evidence of "nonanalogy" or "analogy". See, for example, *Wang Laboratories, Inc. v. Toshiba Corp.*, 993 F.2d 858, 26 USPQ2d 1767 (Fed. Cir. 1993) (Patent claims were directed to single in-line memory modules (SIMMs) for installation on a printed circuit motherboard for use in personal computers. Reference to a SIMM for an industrial controller was not necessarily in the same field of endeavor as the claimed subject matter merely because it related to

memories. Reference was found to be in a different field of endeavor because it involved memory circuits in which modules of varying sizes may be added or replaced, whereas the claimed invention involved compact modular memories).

Braun is directed to a communication system for half duplex digital radios and has a U.S. classification of 370/276. Bishop et al. is directed to a communication protocol for a multiprocessor system to communicate across a bus (not a half duplex radio) and has a U.S. classification of 370/85.6

Lastly, Bishop et al. and Braun are not reasonably pertinent to the particular problem with which the inventor was concerned, which is (generally stated) to determine, by a second data protocol, a length of a second set of data packets that are to be transmitted by a simplex transmission operation on the basis of a data identifier that is determined from a first set of data packets generated by a first transmission data protocol.

Thus, Applicants respectfully submit that it should now be evident that the alleged combination of Braun and Bishop et al. fails to substantiate a *prima facie* case of obviousness.

Independent claim 5

Independent claim 5 is directed to a transmission system that includes a first transmitting/receiving station for transmitting

[6] see *In re Oetiker*, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992).

and receiving data to and from a second transmitting/receiving station via a shortwave radio channel having a fixed data rate. The first and second transmitting/receiving stations each receive inputted data packets that are based on a first data protocol. Data packet identifiers of the inputted data packets, which are based on the first data protocol, are determined, whereby the data packet identifiers identify a number, a length, a priority, or a type of the data packets. Further, second data packets are formed based on a second data protocol and on the basis of the data packet identifiers. The second data packets are then transmitted over the shortwave radio channel, and the first and second transmitting/receiving stations adjust a frequency of switching between transmitting and receiving the second data packets on the basis of the data packet identifiers of the inputted data packets.

In rejecting independent claim 5, the Examiner alleges that the combination of Seazholtz et al. and Bishop et al. supposedly teach the features of claim 5. Applicants respectfully disagree for at least the following reasons.

Seatzholz et al. is directed to a portable radio telephone hanset that can operate as a data transfer terminal and as an analog cellular telephone.

Seatzholz et al., however, contains absolutely no teaching that data packets are received that are based on a first data protocol and that second data packets are formed based on a second

data protocol and on the basis of data packet identifiers (which are based on the first data protocol) so that a frequency of switching between transmitting and receiving is adjusted on the basis of the data packet identifiers, as recited, generally, in claim 5. In other words, Seatzholz et al. does not teach that in the Cellular Digital Packet Data (CDPD) mode that the frequency of switching between transmitting and receiving is adjusted, based on date identification.

Additionally, there is absolutely no motivation to combine Seatzholz et al. with Bishop et al. Similar arguments as provided above with the alleged combination of Braun with Bishop et al. apply hereto as well.

Accordingly, withdrawal of the rejections is respectfully requested. Furthermore, dependent claims 2-4 and 6 should be considered allowable at least for depending from an allowable base claim.

Personal Interview Request

Because it appears that perhaps the Examiner may not fully appreciate the claimed features of the invention, Applicants respectfully request that the Examiner contact Applicants' representative at the phone number below in order to schedule a personal interview.

Conclusion

In view of the above amendments and remarks, this application appears to be in condition for allowance and the Examiner is, therefore, requested to reexamine the application and pass the claims to issue.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Martin R. Geissler (Reg. 51,011) at telephone number (703) 205-8000, which is located in the Washington, DC area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By _____
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JTE/MRG/tm/jeb
4100-0117P

Attachment: One (1) Replacement Drawing
Substitute Specification
Marked-Up Version of Original Specification

~~18-01-2000~~

~~EP 009901220~~

~~1509-P~~

MARKED-UP VERSION OF THE ORIGINAL SPECIFICATION

Method of Optimizing the Data Transmission over a Bidirectional Radio Channel

[0001] This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/EP99/01220 which has an International filing date of February 25, 1999, which designated the United States of America.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] ~~This~~ The present invention relates to and is based on a method ~~according to the definition of the species of the main claim~~ for transmitting over a bi-directional radio channel.

2. Description of the Background Art

[0003] It is known that for transmission of digital data such as digitized speech or other digital information over a (bidirectional) shortwave radio channel in both transmission directions, the digital data to be transmitted, which is transmitted over the radio channel alternately in forward and reverse directions (simplex operation), can be processed according to a predetermined data transmission protocol, also referred to below as DÜP, and divided into individual data packets (e.g., according to A. S. Tanenbaum, *Computer Networks,* Prentice Hall, Englewood Cliffs, 1981, pages 136 ff.; European Patent No. 730,356). This digital data for transmission can also be processed first according to another data transmission protocol at a higher level, i.e., a higherlevel data transmission

protocol, also referred to below as DÜPHE, e.g., according to the known TCP/IP method (transmission control protocol/Internet protocol). For optimizing data transmission over such a bidirectional radio channel, there have already been proposals to determine the bit error rate at the receiving end and transmit it back to the transmitter, where the length of the data packets is revised accordingly (older German Patent Application 196 51 593.9). Furthermore, it is also known that in a data transmission system that operates by the duplex method and has two separate transmission channels, the data rate can vary as a function of the prevailing data occurrence to make the transmission less sensitive to interference (U.S. Patent No. 5,513,213).

[0004] Depending on the type of digital data to be transmitted and the higher-level data transmission protocol (DÜPHE) processing the data, such as TCP/IP, the resulting data packets and acknowledgments in both transmission directions may vary greatly in length and frequency, and thus data throughput can be greatly impaired even when using the above-mentioned optimization of data transmission with the data transmission protocol DÜP.

SUMMARY OF THE INVENTION

[0005] Therefore, the object of this invention is to create a method for optimizing data transmission over a bidirectional radio channel, where the available bidirectional channel capacity is optimally adapted to the data occurrence in both directions.

~~Starting with a method according to the definition of the species of the main claim, this object is achieved by the characterizing features of the main claim. Advantageous refinements are derived from the subordinate claims.~~

[0006] According to this invention, before transmitting the data packets of the data transmission protocol DÜP, data packet identifiers of the higher-level data transmission protocol DÜPHE are determined, i.e., the number and/or length

and/or priority and/or type of data packets is determined, and the length of data packets of data transmission protocol DÜP is adjusted as a function thereof. A wide variety of possible combinations are conceivable for these data packet identifiers. In the simplest case, it may be sufficient to determine only the instantaneous number of data packets or the expected number of data packets. The adjustment is better if, in addition, the instantaneous or expected length of the data packets of the data to be transmitted is also taken into account as an identifier. It is even better to determine the instantaneous or expected priority of incoming data packets from the higher-level data transmission protocol DÜPHE to data transmission protocol DÜP or the instantaneous or expected type of data (information, acknowledgment, control commands or the like). Another identifier may be the respective relevance of data packets of the higher-level data transmission protocol DÜPHE, e.g., the fact that this is a repeat packet. This quantitative determination of data packet identifiers takes place on both sides of the wireless link, and then the length of data packets produced by data transmission protocol DÜP can be adjusted on the basis of these identifiers in the sense of optimum utilization of radio channel capacity, and thus also the frequency in switching between the two directions of the radio channel can be adjusted.

[0007] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWING

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawing which are given by way of illustration only, and thus, are not limitive of the

present invention, and wherein the figure shows a schematic diagram of a transmission system according to a preferred embodiment of the invention.

DETAILED DESCRIPTION

~~This invention is explained in greater detail below on the basis of a schematic diagram illustrating one embodiment.~~

[0008] The figure shows a schematic diagram of a bidirectional shortwave connection between a transmitting and receiving station A and a transmitting and a receiving station B. Digital data to be transmitted is divided by a higher-level data transmission protocol DÜPHE such as TCP/IP into individual data packets that are sent in succession over a radio driver RA to the data transmission protocol DÜP of the actual transmitter of station A and transmitted over the radio channel to remote station B, where the data packets are analyzed in the receiver there according to its data transmission protocol DÜP. Digital data to be transmitted is processed in the same way in the transmission operation of remote station B and sent over a radio driver RB to the data transmission protocol DUP of the transmitter of station B and transmitted over the radio channel to station A. The packets generated by the respective data transmission protocol DÜP may be composed of a variable number of frames, for example, where the number of frames per packet may be between 1 and 15, for example, depending on the quality of the wireless link. Each frame may in turn consist of a 5 byte header of control information, followed by a data part between 4 and 250 bytes long, for example, and a redundancy code (CRC) 2 bytes long, for example. Through the choice of the data volume per frame and the choice of the number of frames per packet, the packet length of the data transmission protocol DÜP can be selected as desired, e.g., between 64 bytes and 8 kbytes, in each station A and B at the transmitting end.

[0009] Of the incoming data packets in radio drivers RA and RB from the higher-level data transmission protocol DÜPHE, the number, length, priority and

type (control information, data information, acknowledgments, etc.) are determined, and depending on these characteristics, the data transmission protocol DÜP with which the data packets to be transmitted are divided into individual data packets before being transmitted over the transmitter of station A is adjusted accordingly. For example, if a number of short data packets of 100 bytes, for example, to be transmitted is detected in radio driver RA, then the length of data packets generated according to the data transmission protocol DÜP is set at this length. If a plurality of long packets of several kilobytes, for example, arrive at the radio driver, the packets DÜP are lengthened as much as allowed by the data occurrence at the remote station and the instantaneous channel quality.

[0010] The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are to be included within the scope of the following claims.

ABSTRACT

The invention relates to an arrangement for optimizing the data transmission over a bidirectional radio channel. According to the invention, the digital data to be transmitted according to a data transmission protocol is divided into individual data packets in each of two transmitting/receiving stations. In each transmitting/receiving station, the number and/or priority and/or type (e.g. information, control characters, repeat blocks) of the data packets ~~generate~~ generated by the data transmission protocol of the higher level and transmitted to the respective transmitter of the station is determined (data packet identifications). According to the data packet identifications, the data transmission protocol is then selected in at least one of the stations in accordance with an ~~optical~~ optimum utilization of the radio channel capacity.